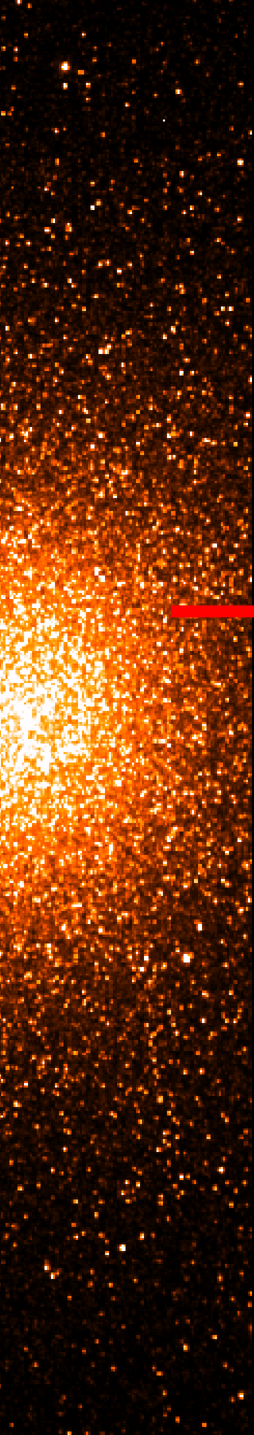

The s-process in intermediate mass AGB stars

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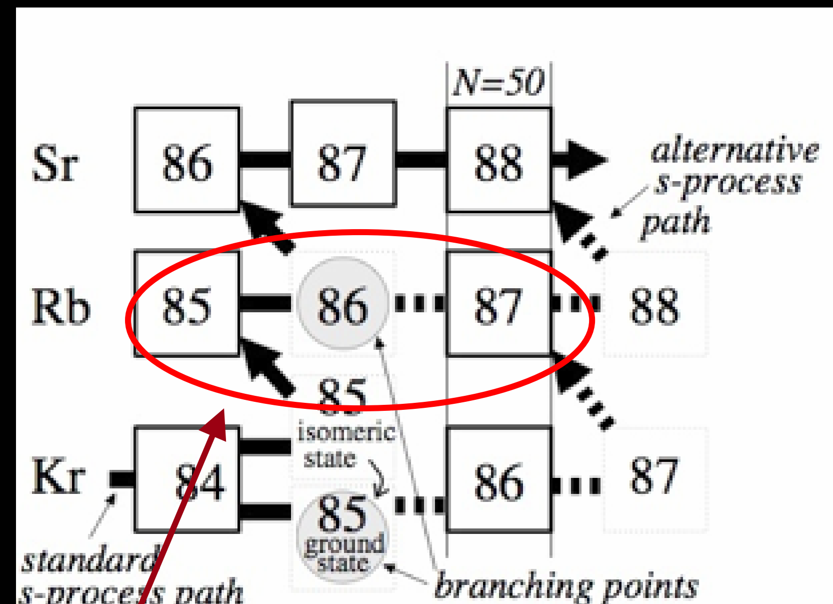
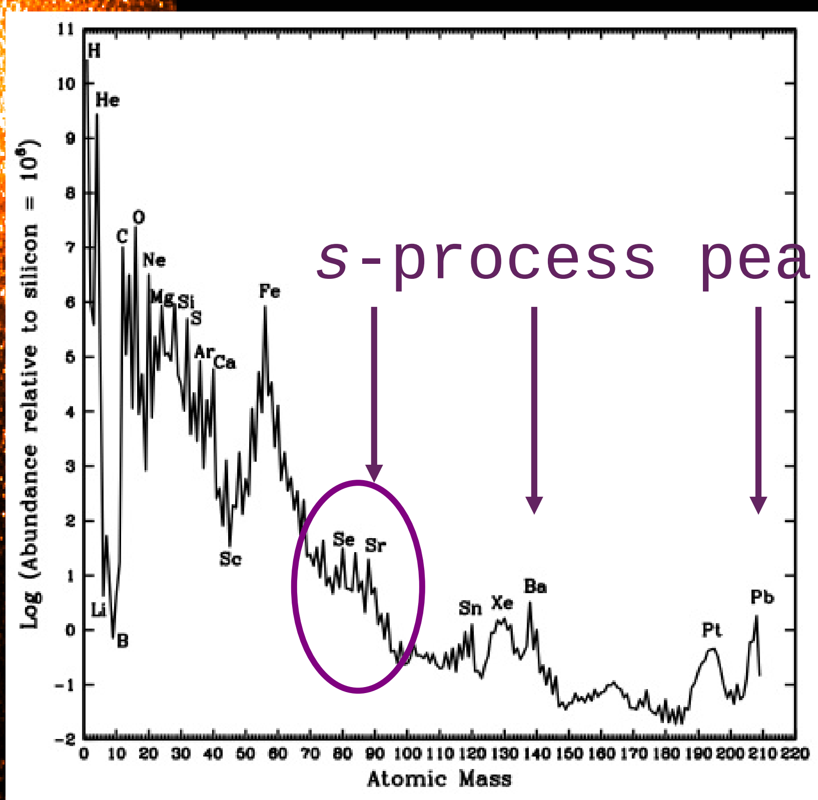
The slow neutron capture process

The s process is responsible for the production of about half the abundances of elements heavier than iron in the Galaxy.





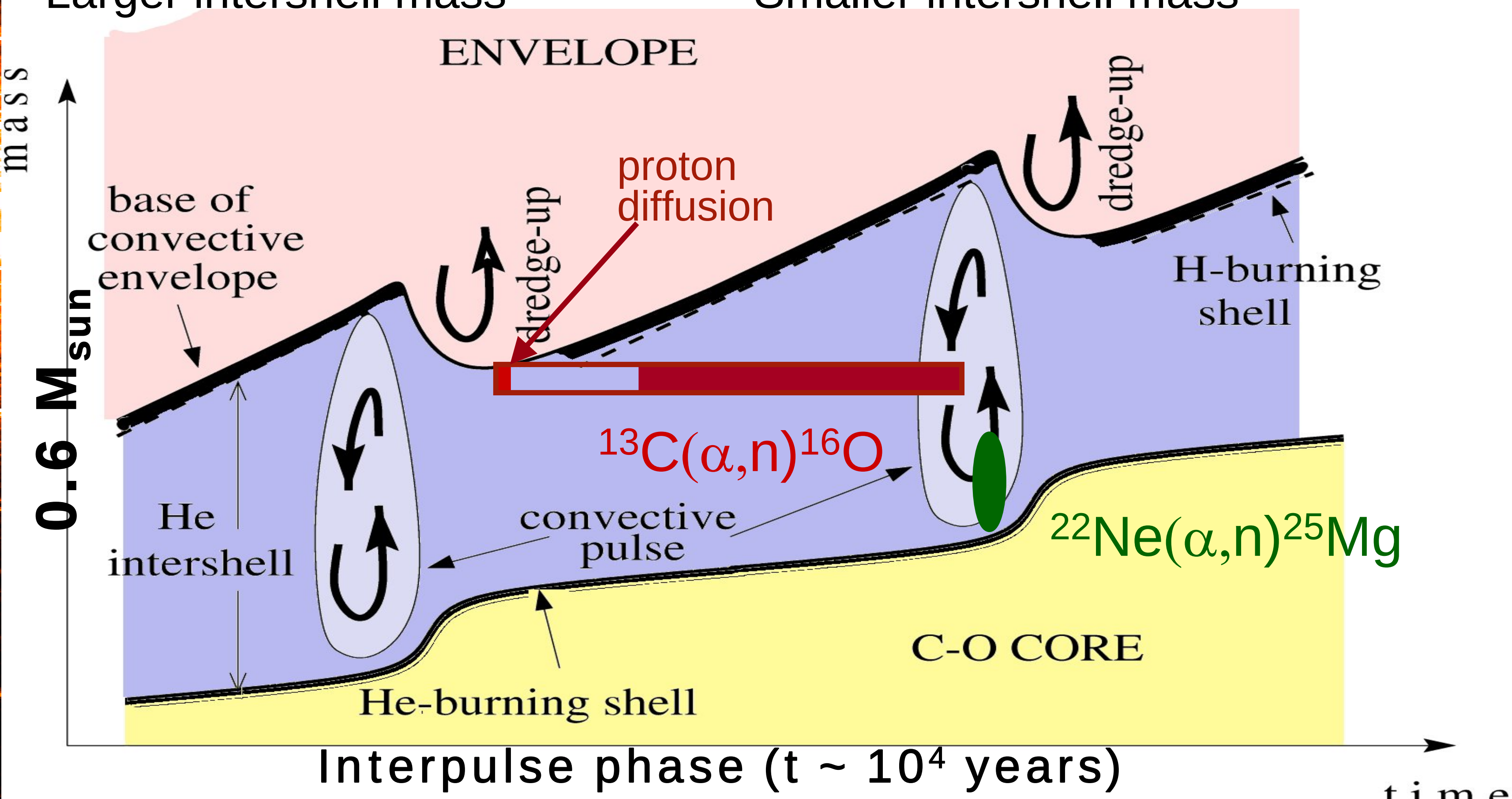
During the s process:

$N_n \sim 10^7$ n/cm^3; $t(n,g) \gg t_b$

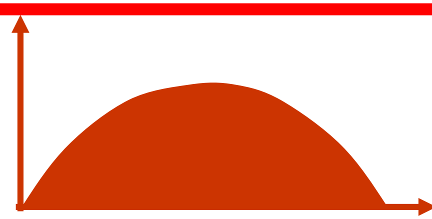
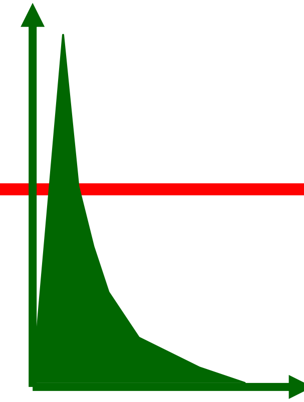
At $N_n = 5 \times 10^8$ n/cm^3 ~80% of the flux goes through ^{86}Kr

Theoretical models: the neutron sources

Low mass AGBs		Intermediate mass AGBs
Lower temperature	$\sim 4\ M_{\odot}$	Higher temperature
Larger intershell mass		Smaller intershell mass



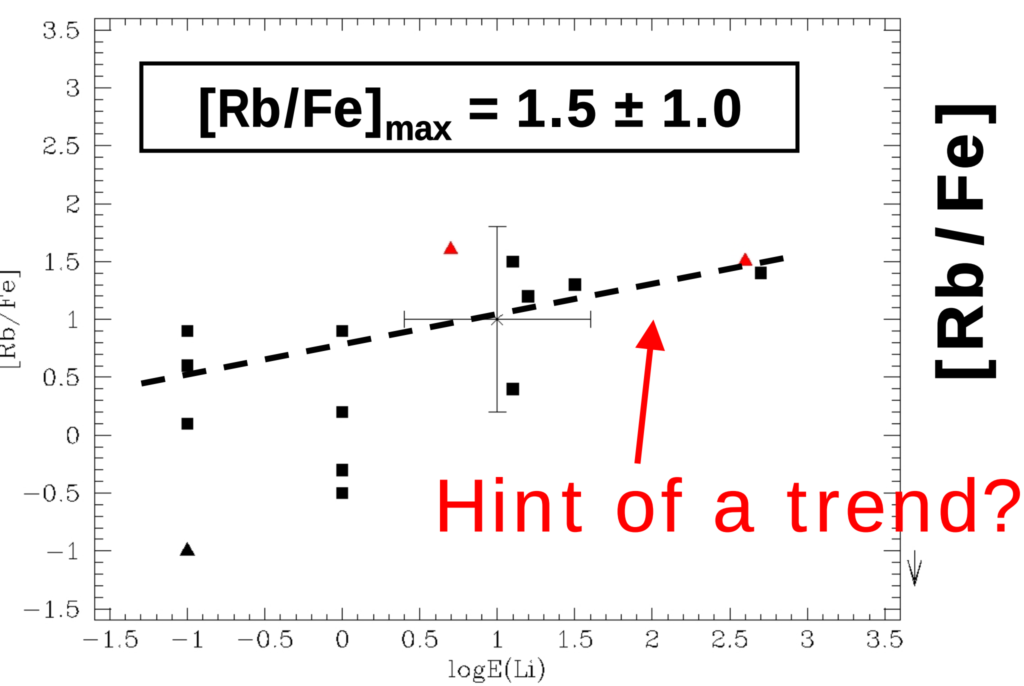
Theoretical models

	Low mass	Intermediate mass
Typical neutron density profile in time:		
Neutron source	$^{13}C(a,n)^{16}O$	$^{22}Ne(a,n)^{25}Mg$
Maximum of neutron density	10^8 n/cm^3	10^{11} n/cm^3
Timescale	10,000 yr	10 yr
Neutron exposure	0.3 mbarn^{-1}	0.02 mbarn^{-1}

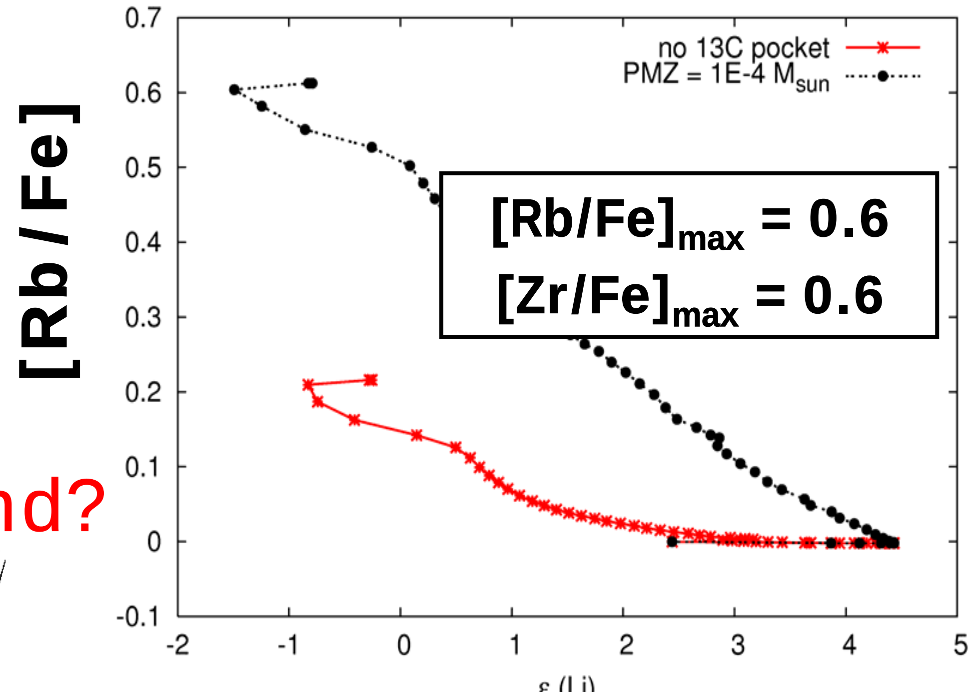
(at solar metallicity)

How do the models do?

Observed Li and Rb abundances:



6.5M_{sun}, Z =0.012:



Log ε(Li) = log(Li / H) + 12

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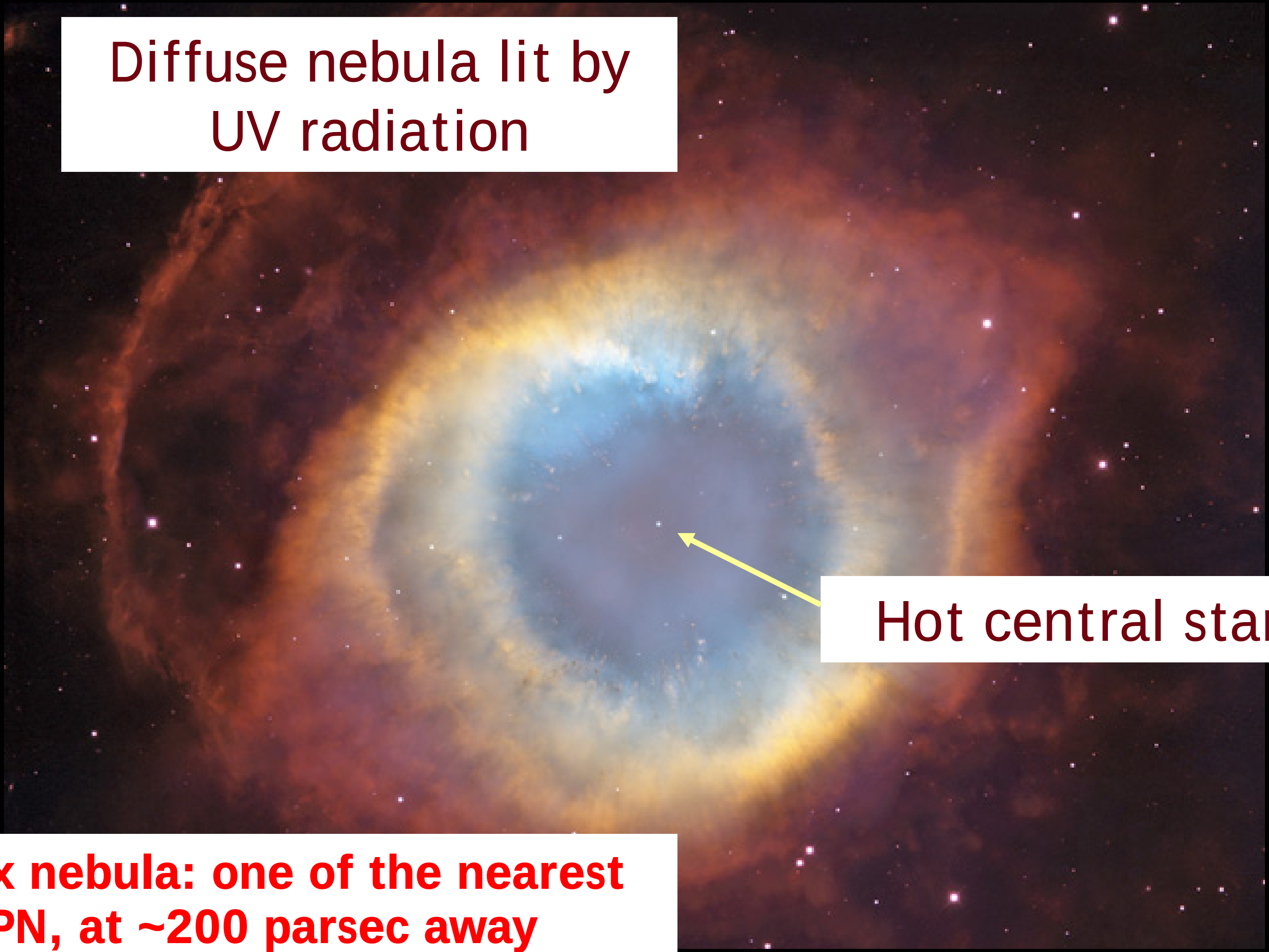
S-process elements in PN



Helix nebula: one of the nearest PN, at ~200 parsec away

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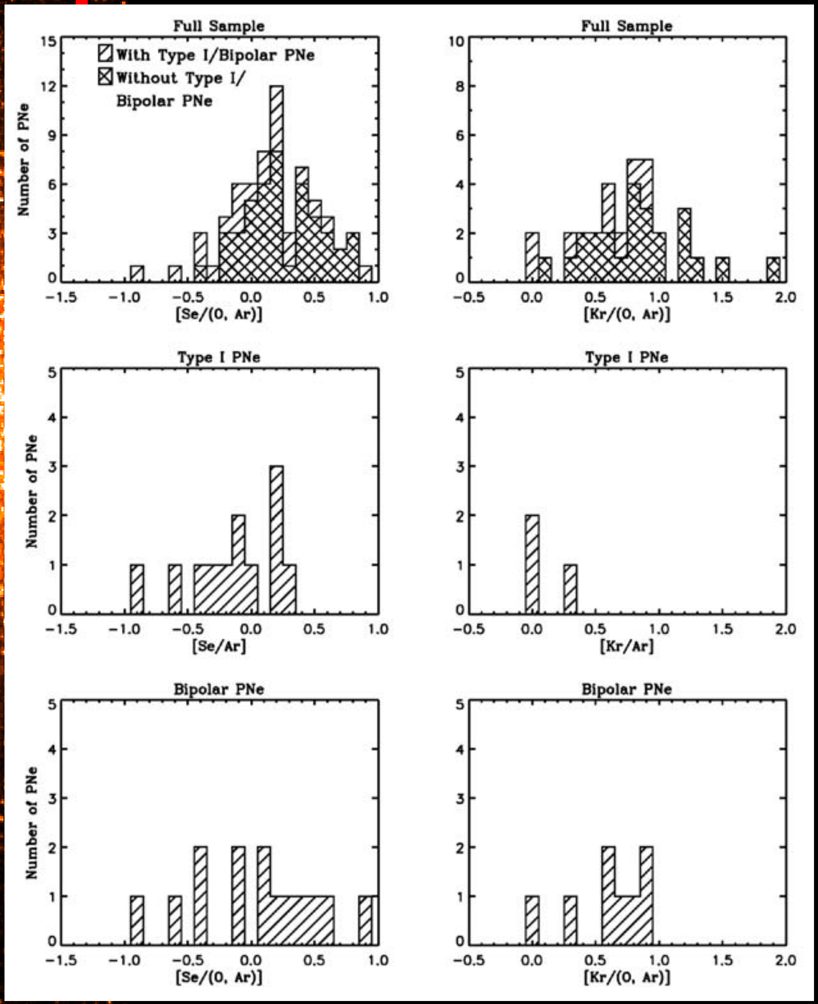
Se and Kr abundances in PN



- Sample contains over 100 PN
- Separate by morphology type
- Type I come from intermediate mass progenitors (2.5 to 8Msun)
- Can we use these abundances to constrain the stellar models?

From Sterling & Dinerstein (2007, ApJ, in press)

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Summary & Future work

- Compare models of intermediate-mass AGB stars to the Se, Kr abundances in Type I PNe (Karakas et al. in preparation)
- Summary: at solar Z, intermediate-mass AGB stars match the observations fairly well
- Compare models of the Rb and Zr abundances in massive Galactic O-rich AGB stars (van Raai et al., in preparation)
- Summary: We do not produce enough Rb! More massive model required (~8M_{sun})? Nuclear reaction rate uncertainties? Other model uncertainties?

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